CLAIMS

What is claimed is:

1. In a metropolitan area network, a method for implementing weighted fair flow control on the network, the method comprising the steps of:

a) accepting data from a plurality of local input flows at an MPS (metro packet switch), each local input flow having a corresponding QoS (quality of service);

b) queuing the data from the local input flows with plurality of per flow queues, wherein each local input flow has a respective one of the per flow queues;

c) maintaining a track of a flow rate of each local input flow using a corresponding virtual queue; and

d) transmitting data from the local input flows across a communications channel of the network, wherein the bandwidth of the communications channel is allocated in accordance with the QoS of each local input flow, the QoS used to determine the rate of transmission from the per flow queue to the communications channel to implement a weighted bandwidth utilization.

2. The method of Claim 1, further including the step of:

allocating the bandwidth of the communications channel by throttling the rate at which data is transmitted from an upstream MPS with respect to the rate at which data is transmitted from a downstream MPS to implement a fair bandwidth utilization of the communications channel.

3. The method of Clam 1, further including the step of:

coordinating the rate at which data is transmitted from the respective per flow queues of the MPS to the communications channel to maintain the respective corresponding QoS, the coordinating performed by a scheduler within the MPS.

4. The method of Claim 1 wherein the QoS includes at least a first level and a second level, the first level having a higher priority than the second level.

5. The method of Claim 1 further including the step of:

monitoring QoS compliance of the local input flows by monitoring the depth of the virtual queues.

6. The method of Claim 1 further including the step of:

monitoring the depth of the virtual queues wherein each of the virtual queues keeps track of a backlog of the corresponding local input flow without physically buffering the local input flow.

7. The method of Claim 6 wherein a backlogged virtual queue indicates the corresponding local input flow exceeds an allowed rate.

8. The method of Claim 1 wherein the communications channel is an ethernet communications channel.

9. The method of Claim 1 wherein the metropolitan area network is a ring topology metropolitan area network.

10. In a metropolitan area network, a method for implementing weighted fair flow control on the network, the method comprising the steps of:

a) accepting a plurality of local input flows at each of a plurality of MPS for transport across a communications channel;

b) transporting data among the MPS via the communications channel asynchronously, wherein the plurality of MPS include at least one upstream MPS and one downstream MPS;

c) for each MPS:

c1) assigning a QoS to each local input flow;

c2) allocating a portion of insertion traffic bandwidth of the MPS to each local input flow in accordance with the QoS to implement weighted bandwidth allocation;

c3) inserting the insertion traffic of the MPS onto the communications channel using an available opening in the communications channel;

c4) if the insertion traffic needs to be reduced, reducing the allocation to those local input flows having a lower QoS before reducing the allocation to those local input flows having a higher QoS; and

d) if the downstream MPS experiences congestion, throttling the insertion traffic of the upstream MPS to implement fair bandwidth allocation.

11. The method of Claim 10 wherein the QoS includes at least a first level and a second level, the first level having a higher priority than the second level.

12. The method of Claim 10 wherein the communications channel is an ethernet communications channel.

13. The method of Claim 12 wherein the communications channel is a 10 gigabit ethernet communications channel.

14. The method of Claim 10 wherein the metropolitan area network is a ring topology metropolitan area network.

15. The method of Claim 10 wherein transit traffic on the communications channel is given strict priority with respect to insertion traffic from each MPS.

16. The method of Claim 10 further including the step of:

minimizing jitter for higher QoS local input flows by reserving a portion of the insertion traffic of each MPS for the higher QoS local input flow.

17. A metro packet switch system for implementing weighted fair flow control on a metropolitan packet transport ring network, comprising:

an MPS (metro packet switch) for accepting data from a plurality of local input flows, each local input flow having a corresponding QoS (quality of service);

a plurality of virtual queues included in the MPS, wherein each local input flow has a respective one of the virtual queues configured to maintain a track of a flow rate of each local input flow; and

a communications channel coupled to the MPS for receiving data from the local input flows transmitted by the MPS, wherein the MPS allocates the bandwidth of the communications channel in accordance with the QoS of each local input flow, and wherein the QoS used to determine the rate of

transmission to the communications channel to implement a weighted bandwidth utilization of the communications channel.

18. The system of Claim 17, wherein the MPS is configured to allocate the bandwidth of the communications channel by throttling the rate at which data is transmitted from an upstream MPS with respect to the rate at which data is transmitted from a downstream MPS to implement a fair bandwidth utilization of the communications channel.

19. The system of Clam 17, wherein the MPS is configured to coordinate the rate at which data is transmitted to the communications channel to maintain the respective corresponding QoS, the coordinating performed by a scheduler within the MPS.

20. The system of Claim 17 wherein the QoS includes at least a first level and a second level, the first level having a higher priority than the second level.

21. The system of Claim 17 wherein the MPS is configured to monitor the QoS compliance of the local input flows by monitoring the depth of the virtual queues.

22. The system of Claim 17 wherein the MPS is configured to monitor the depth of the virtual queues wherein each of the virtual queues keeps track of a backlog of the corresponding local input flow without physically buffering the local input flow.

23. The system of Claim 17 wherein a backlogged virtual queue indicates the corresponding local input flow exceeds an allowed rate.

24. The system of Claim 17 wherein the communications channel is an ethernet communications channel.

25. The system of Claim 17 wherein the metropolitan area network is a ring topology metropolitan area network.